BIGTREETECH TMC5160-WA Stepper Motor Driver User Manual

Contents

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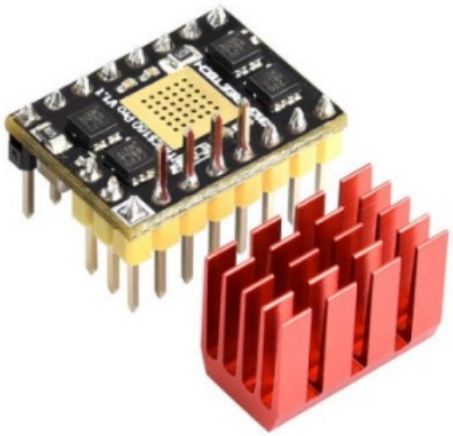


Introduction

TMC5160 is a control chip of high-power stepper motor with MOS power expansion,20A maximum current and low heat generation.
StealthChop2 mode for TRINAMICs eliminates motor noise by reducing resonance. StallGuard2 filament blockage detection enables stepper motor torque control or back to zero without a sensor, which is a safe detection of motor stopping and the replacement of mechanical stop switch. DcStep allows the motor to run near its load limit and speed limit, achieving 10x or higher range without any pulse loss. SpreadCycle is high precision chopping algorithm for highly dynamic motor motion and generating absolutely clean current waves. Low noise, low resonance and low vibration chopper. CoolStep current control optimizes driver performance and energy efficiency, enables smooth and silent drive, balances speed and motor torque, reduces energy consumption by 75 %.
TMC5160 is an upgrade of TMC2100, TMC2130 and TMC5130 series, with higher voltage and motor currents.

Product Parameters

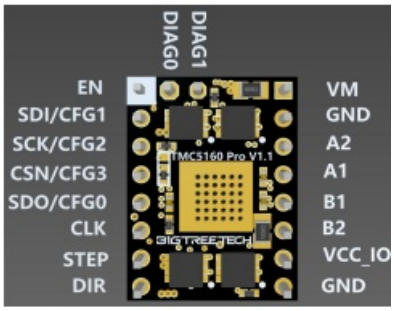
- **Driver Chip** TMC5160-WA
- **Product Size** 15.3mm*20.4mm
- **Supply Voltage** 8V—56V
- **Maximum Current** 3A
- (maximum current of 2.54 single-row pins-3A)
- **Maximum Segmentation** 256 Working Mode SPI Mode SD Mode

Advantages

1. External power MOS tube, for higher current 2 Ultra-silent mode
2. Less motor jittering
3. less pulse loss
4. It is able to drive 57 stepper motor

Pins Instruction

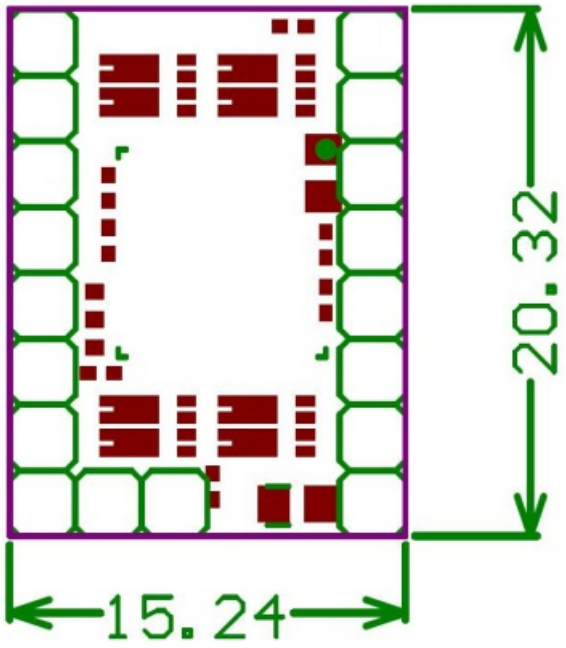
Names of pins



Functions of pins

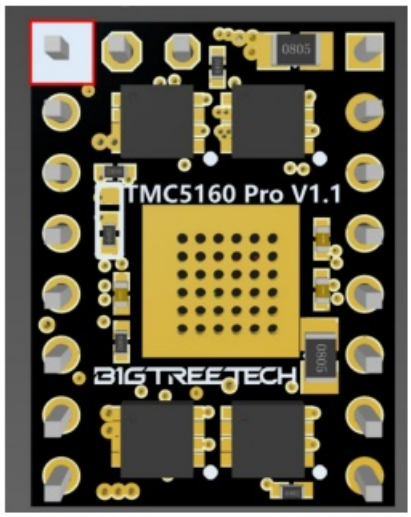
J1	Functions	J2	Functions
1	EN	1	VM
2	SDI/CFG1	2	GND
3	SCK/CFG2	3	A2
4	CSN/CFG3	4	A1
5	SDO/CFG0	5	B1
6	CLK	6	B2
7	STEP	7	VCC_IO
8	DIR	8	GND

Product Size



Driver installation

The pins with white boxes on the driver are enable (EN) pins



SD_MODE

The factory default mode SD_MODE = 1 , the STEP / DIR input pins control the driver as shown

To use SD_MODE =0, step signal is made by internal ramp generator the resistor is welded to the other side as shown

Heat dissipation

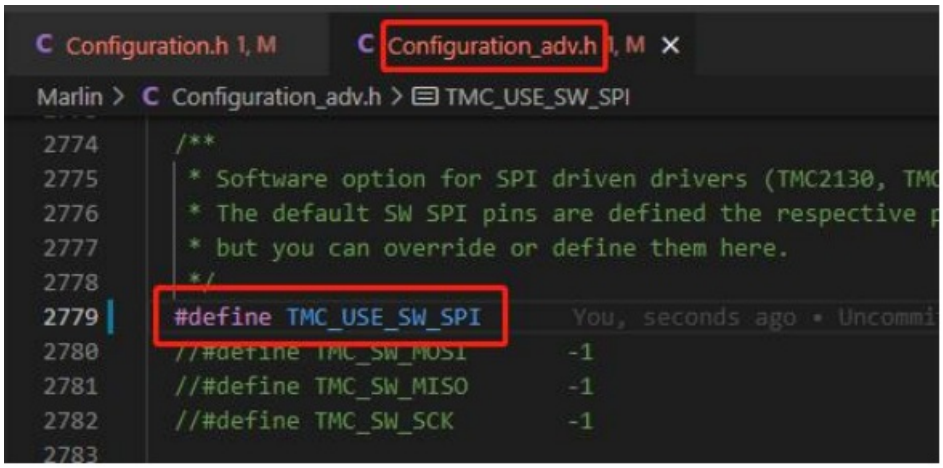
- It is recommended to add active heat dissipation to the TMC5160 Pro When the current is over 1A.
- With an 12V/5V LDO inside, excessive differential pressure brings more heat. It is recommended to add active heat dissipation to the TMC5160 Pro to ensure the stability of the printing system when the voltage is higher than 40V.

Firmware Configuration

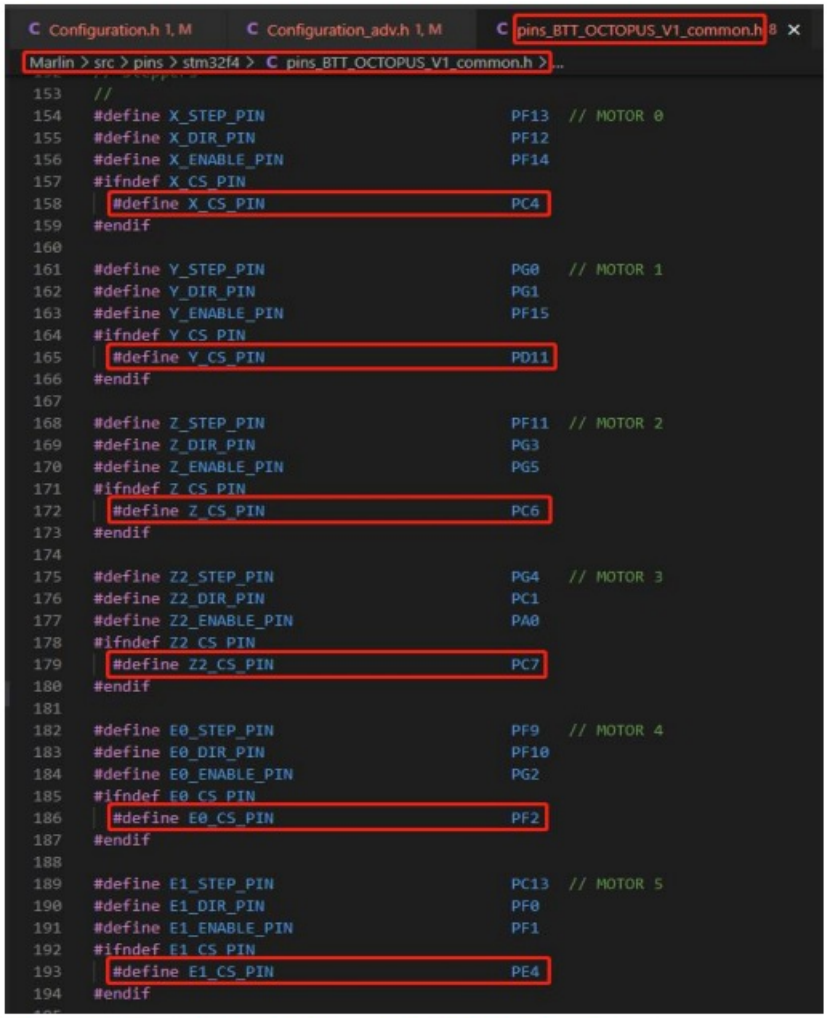
1. **Marlin**
    - **a.**Set the driver as TMC5160 in Configuration.h

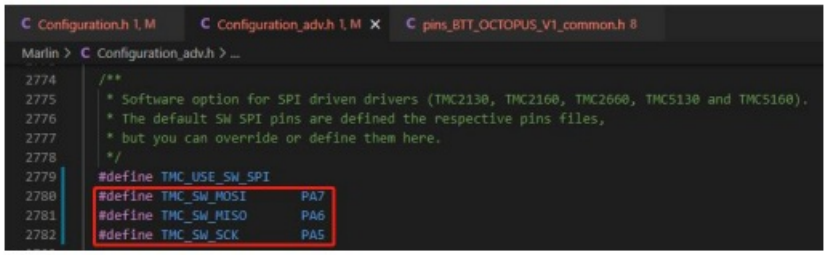
```
Configuration.h 1, M
Marlin > Configuration.h > ...
836  /**
837   * Stepper Drivers
838   *
839   * These settings allow Marlin to tune stepper driver timing and enable advanced options for
840   * stepper drivers that support them. You may also override timing options in Configuration_adv.h.
841   *
842   * A4988 is assumed for unspecified drivers.
843   *
844   * Use TMC2208/TMC2208_STANDALONE for TMC2225 drivers and TMC2209/TMC2209_STANDALONE for TMC2226 drivers.
845   *
846   * Options: A4988, A5984, DRV8825, LV8729, L6470, L6474, POWERSTEP01,
847   *          TB6560, TB6600, TMC2100,
848   *          TMC2130, TMC2130_STANDALONE, TMC2160, TMC2160_STANDALONE,
849   *          TMC2208, TMC2208_STANDALONE, TMC2209, TMC2209_STANDALONE,
850   *          TMC26X,  TMC26X_STANDALONE,  TMC2660, TMC2660_STANDALONE,
851   *          TMC5130, TMC5130_STANDALONE, TMC5160, TMC5160_STANDALONE
852   * :['A4988', 'A5984', 'DRV8825', 'LV8729', 'L6470', 'L6474', 'POWERSTEP01', 'TB6560', 'TB6600', 'TMC2100',
853   */
854  #define X_DRIVER_TYPE  TMC5160
855  #define Y_DRIVER_TYPE  TMC5160
856  #define Z_DRIVER_TYPE  TMC5160
857  //#define X2_DRIVER_TYPE A4988
858  //#define Y2_DRIVER_TYPE A4988
859  //#define Z2_DRIVER_TYPE A4988
860  //#define Z3_DRIVER_TYPE A4988
861  //#define Z4_DRIVER_TYPE A4988
862  //#define I_DRIVER_TYPE  A4988
863  //#define J_DRIVER_TYPE  A4988
864  //#define K_DRIVER_TYPE  A4988
865  #define E0_DRIVER_TYPE TMC5160
866  //#define E1_DRIVER_TYPE A4988
867  //#define E2_DRIVER_TYPE A4988
868  //#define E3_DRIVER_TYPE A4988
869  //#define E4_DRIVER_TYPE A4988
870  //#define E5_DRIVER_TYPE A4988
871  //#define E6_DRIVER_TYPE A4988
872  //#define E7_DRIVER_TYPE A4988
```

    - **b.I**f there is independent SPI port, set TMC_USE_SW_SPI in Configuration_adv.h

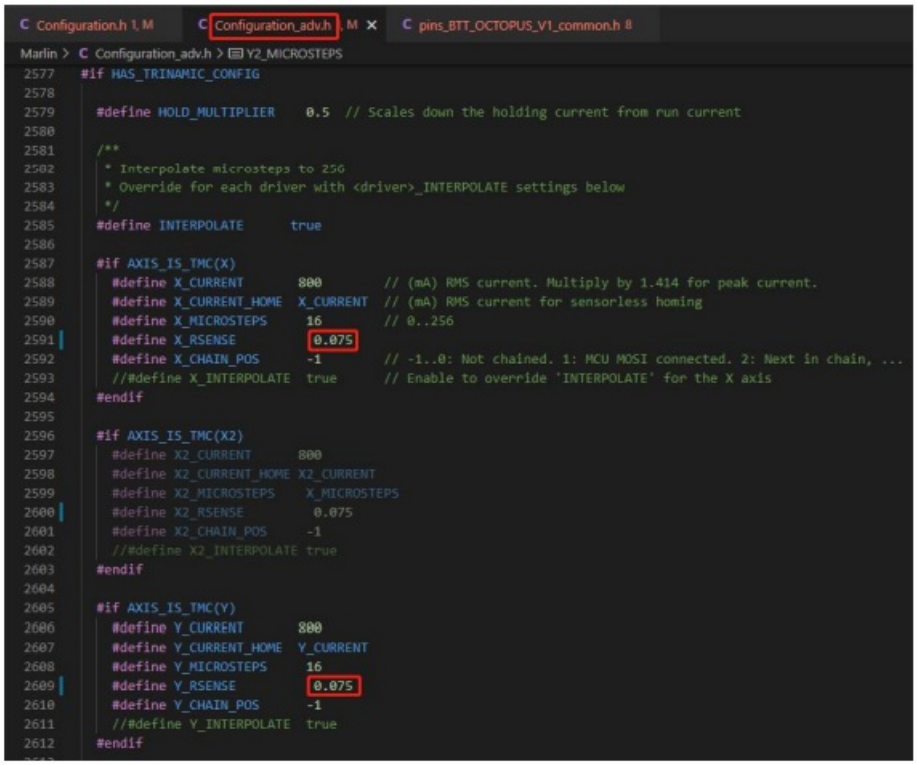


- **c.**If the motherboard needs custom pins, customize the CS signal lines in the “pins_xxx.h” and the SPI signal lines in“Configuration_adv





- **d.**Set the sampling resistance to 0.075 (the sampling resistance value of the driver is 0.075), and set the current and subdivision according to your own needs.



2. **2. Klipper**

   Set the current and subdivision according.

   For more details, please refer to: https://www.klipper3d.org/Config_Reference.html#tmc5160

Caution

1. Disconnect the power supply before driver installation.
2. Confirm the direction of driver to avoid reverse insertion.
3. Do not plug and unplug the driver module when power is on to avoid damage.
4. Please note that the heat sink cannot contact with the pins to prevent the driver from short circuit.
5. TMC5160 is sensitive to static electricity, please be careful.
6. It is recommended to add the active heat dissipation when using higher current or higher voltage.
7. No touching after power on to avoid accident (especially when the power input is 36V or higher.) 13 / 14

Download link

https://github.com/bigtreetech/BIGTREETECH-Stepper-Motor-Driver

Shenzhen Big Tree Technology CO.,LTD .
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Documents / Resources

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